IN THE CLAIMS

1. (currently amended) A method of forming a semiconductor layer structure, said method comprising:

forming a ~~modulation~~ doped nitride semiconductor layer ~~structure atop at least a portion of another layer~~ by alternately growing ~~forming at least one sub-layer of~~ doped nitride semiconductor material and ~~at least one sub-layer of~~ initially undoped nitride semiconductor material repeatedly atop ~~the~~ at least a portion of ~~said~~ another layer in a manner that causes part of the dopants in the doped nitride semiconductor material to diffuse into the initially undoped nitride semiconductor material and results in ~~such that~~ the ~~resulting modulation~~ doped nitride semiconductor layer ~~structure~~ having~~s~~ ~~an~~ ~~overall~~ doping concentration that is substantially uniform along its depth and ~~of~~ at most 2E16 cm^{-3}.

2. (cancelled)

3. (original) A method as claimed in claim 1 wherein said forming step is carried out by a process selected from the group consisting of reactive sputtering, metal organic chemical vapor deposition (MOCVD), molecular beam epitaxy (MBE) and atomic layer epitaxy.

4. (cancelled)

5. (currently amended) A method as claimed in claim 1 wherein said ~~modulation~~ doped nitride semiconductor layer includes a gallium nitride-based semiconductor.

6. (currently amended) A method as claimed in claim 1 wherein said ~~modulation~~ doped nitride semiconductor layer includes GaN.

7. (currently amended) A method as claimed in claim 1 wherein said ~~modulation~~ doped nitride semiconductor layer is n-type.

8. (currently amended) A method as claimed in claim 1 wherein said ~~modulation~~ doped nitride semiconductor layer has a doping concentration of at least 4E15 cm^{-3}.

9. (currently amended) A method as claimed in claim 1 wherein said ~~modulation~~ doped nitride semiconductor layer has a thickness of at least 0.2 μm.

10. (currently amended) A method as claimed in claim 1 wherein said ~~modulation~~ doped nitride semiconductor layer has a thickness of at most 10 μm.

11. (currently amended) A method as claimed in claim 1 wherein said doped nitride semiconductor material is grown to ~~sub-layer of said modulation doped layer has~~ a thickness of at least 0.005 μm.

12. (currently amended) A method as claimed in claim 1 wherein said doped nitride semiconductor material is grown to ~~sub-layer of said modulation doped layer has~~ a thickness of at most 0.1 μm.

13. (currently amended) A method as claimed in claim 1 wherein said initially undoped nitride semiconductor material is grown to ~~sub-layer of said modulation doped layer has~~ a thickness of at least 0.005 μm.

14. (currently amended) A method as claimed in claim 1 wherein said initially undoped nitride semiconductor material is grown to ~~sub-layer of said modulation doped layer has~~ a thickness of at most 0.1 μm.

15. (currently amended) A method of forming a Schottky junction including forming a ~~modulation~~ doped nitride semiconductor layer as claimed in claim 1 and forming a metal contact layer atop said modulation doped layer.

16. (original) A method of forming a Schottky diode including forming a Schottky junction as claimed in claim 15 and forming an ohmic contact on another portion of said another layer.

17. (currently amended) A method of forming a Schottky diode, said method comprising:

forming a ~~modulation~~ doped nitride semiconductor layer ~~structure atop at least a portion of another layer~~ by alternately growing ~~forming alternating sub layers of~~ doped nitride semiconductor material and initially undoped nitride semiconductor material repeatedly atop ~~the~~ at least a portion of ~~said~~ another layer in a manner that causes part of the dopants in the doped nitride semiconductor material to diffuse into the initially undoped nitride semiconductor material and results in ~~such that~~ the ~~resulting modulation~~ doped nitride semiconductor layer ~~structure~~ having~~s~~ ~~an~~ ~~overall~~ doping concentration that is substantially uniform along its depth and ~~of~~ at most 2E16 cm^{-3};

forming a metallic contact layer atop at least part of said ~~modulation~~ doped nitride semiconductor layer to form a Schottky junction therewith; and

forming at least one further metallic contact layer on at least part of said another layer in substantially ohmic contact therewith;

whereby a ratio of an on-resistance of said Schottky diode to a breakdown voltage of said Schottky diode is at most $2x10^{-5}$ Ω cm^2/V.

18. (cancelled)

19. (currently amended) A method as claimed in claim 17 wherein said step of forming a ~~modulation~~ doped nitride semiconductor layer is carried out by a process selected from the group consisting of reactive sputtering, metal organic chemical vapor deposition (MOCVD), molecular beam epitaxy (MBE) and atomic layer epitaxy.

20. (currently amended) A method as claimed in claim 17 wherein said ~~modulation~~ doped nitride semiconductor layer includes a gallium nitride-based semiconductor.

21. (currently amended) A method as claimed in claim 17 wherein said ~~modulation~~ doped nitride semiconductor layer includes GaN.

22. (currently amended) A method as claimed in claim 17 wherein said ~~modulation~~ doped nitride semiconductor layer is n-type.

23. (currently amended) A method as claimed in claim 17 wherein said ~~modulation~~ doped nitride semiconductor layer has a thickness of at least 0.2 μm.

24. (currently amended) A method as claimed in claim 17 wherein said ~~modulation~~ doped nitride semiconductor layer has a thickness of at most 10 μm.

25. (currently amended) A method as claimed in claim 17 wherein said doped nitride semiconductor material is grown to ~~sub-layer of said modulation doped layer has~~ a thickness of at least 0.005 μm.

26. (currently amended) A method as claimed in claim 17 wherein said doped nitride semiconductor material is grown to ~~sub-layer of said modulation doped layer has~~ a thickness of at most 0.1 μm.

27. (currently amended) A method as claimed in claim 17 wherein said initially undoped nitride semiconductor material is grown to ~~sub-layer of said modulation doped layer has~~ a thickness of at least 0.005 μm.

28. (currently amended) A method as claimed in claim 17 wherein said initially undoped nitride semiconductor material is grown to ~~sub-layer of said modulation doped layer has~~ a thickness of at most 0.1 μm.

29. (previously presented) A method as claimed in claim 17 wherein said metallic contact layer is selected from the

group consisting of platinum (Pt), palladium (Pd), and nickel (Ni).

30. (currently amended) A method as claimed in claim 17 wherein said another layer comprises another doped layer of nitride semiconductor, and said method further comprises forming said another layer atop a substrate prior to said step of forming said ~~modulation~~ doped nitride semiconductor layer atop said at least portion of said another layer, said ~~modulation~~ doped nitride semiconductor layer and said another layer being of the same conductivity type, said another layer being more highly doped than said ~~modulation~~ doped nitride semiconductor layer.

31. (original) A method as claimed in claim 30 wherein said another doped layer includes a gallium nitride-based semiconductor.

32. (original) A method as claimed in claim 30 wherein said another doped layer includes GaN.

33. (original) A method as claimed in claim 30 wherein said another doped layer is n-type.

34. (original) A method as claimed in claim 30 wherein said another doped layer has a doping concentration of at least 4E18 cm^{-3}.

35. (original) A method as claimed in claim 30 wherein said substrate is selected from the group consisting of sapphire, silicon carbide, doped silicon and undoped silicon.

36. (original) A method as claimed in claim 17 wherein said ohmic metal contact layer is selected from the group consisting of aluminum/titanium/platinum/gold (Al/Ti/Pt/Au) and titanium/aluminum/platinum/gold (Ti/Al/Pt/Au).

37. - 70. (cancelled)

71. (currently amended) A method of forming a Schottky diode, said method comprising:

forming a lower layer of n-type doped nitride semiconductor atop a substrate;

forming an upper layer of n-type doped ~~structure atop at least a portion of said lower layer of~~ nitride semiconductor by alternately growing ~~forming alternating sub-layers of~~ n-type doped nitride semiconductor material and initially undoped nitride semiconductor material repeatedly atop at least a portion of said lower layer of nitride semiconductor in a manner that causes part of the dopants in the doped nitride semiconductor material to diffuse into the initially undoped nitride semiconductor material and results in ~~such that~~ the ~~resulting~~ upper layer of n-type doped nitride semiconductor ~~structure~~ having~~s~~ ~~an overall~~ doping concentration that is substantially uniform along its depth and ~~of~~ at most 2E16 cm^{-3}, said forming of said upper ~~sub-~~layer~~s~~ of n-type doped nitride semiconductor being ~~formed~~ carried out by a process selected from the group consisting of reactive sputtering, metal organic chemical vapor deposition (MOCVD), molecular beam epitaxy (MBE) and atomic layer epitaxy, said lower layer of nitride semiconductor being more highly doped than said upper layer of nitride semiconductor;

forming a first metal contact layer atop said upper layer ~~structure~~ of n-type doped nitride semiconductor such that a Schottky contact is formed; and

forming a second metal contact layer atop said lower layer of n-type doped nitride semiconductor such that an ohmic contact is formed;

whereby a ratio of an on-resistance of said Schottky diode to a breakdown voltage of said Schottky diode is at most $2x10^{-5}$ Ω cm^2/V.

72. (currently amended) A method as claimed in claim 71 wherein at least one of said upper layer of n-type doped nitride

semiconductor and said lower layer of n-type doped nitride semiconductor includes a gallium nitride-based semiconductor.

73. (currently amended) A method as claimed in claim 71 wherein at least one of said upper layer of n-type doped nitride semiconductor and said lower layer of n-type doped nitride semiconductor includes GaN.

74. - 76. (cancelled)